

ABSTRACT OF THE DISCLOSURE

A memory cell has a trench formed into a surface of a semiconductor substrate, and spaced apart source and drain regions with a channel region formed therebetween. The source region is formed underneath the trench, and the channel region includes a first portion extending
5 vertically along a sidewall of the trench and a second portion extending horizontally along the substrate surface. An electrically conductive floating gate is disposed in the trench adjacent to and insulated from the channel region first portion. An electrically conductive control gate is disposed over and insulated from the channel region second portion. A block of conductive material has at least a lower portion thereof disposed in the trench adjacent to and insulated from
10 the floating gate, and can be electrically connected to the source region. A method of programming the cell comprises the steps of creating an inversion layer in the second portion of the channel. A stream of electrons is generated at the drain region which is adjacent to the inversion layer, and the stream of electrons is passed through the inversion layer, reaching a pinch off point. The electrons are accelerated through the depletion region by the field lines
15 from the floating gate, with little or no scattering, causing the electrons to be accelerated through the insulator, separating the floating gate from the substrate, and injected onto the floating gate.

20

25